REMARKS

In checking the application documents, in Figs. 1 and 7, the gas-introduction channel 20 was not shown to be connected to the gas-introduction pipe 41, though they are connected together as explained in paragraph 0020 of the specification. Therefore, the proposed drawing corrections have been filed.

In paragraph 2 of the Action, claims 29, 31, 33-34, 36-44, 46, 48-49 and 51-58 were rejected under 35 U.S.C. 103(a) as being unpatentable over Mountsier et al. in view of Moslehi. In paragraph 3 of the Action, claims 30, 32, 35, 45, 47 and 50 were rejected under 35 U.S.C. 103(a) as being unpatentable over Mountsier et al. in view of Moslehi and Sexton et al. In view of the rejections, claims 29, 33, 44, 46, 48 and 49 have been amended.

An electro-static chucking mechanism for chucking an object electro-statically in claim 29 basically comprises a stage including a dielectric block having a chucking surface with a concave portion to be closed by the object for chucking thereon; gas introducing channels communicating with the concave portion; a chucking electrode provided in the dielectric block; a main body fixed to the dielectric block and having a cavity; a temperature controller attached to the main body to circulate a coolant to the cavity for controlling temperature of the object; a chucking power supply connected to the chucking electrode to apply voltage thereto to chuck the object; and a gas introduction system connected to the gas introducing channels for introducing heat-exchange gas into the concave portion to control temperature of the object while increasing pressure in the concave.

In claim 29, the chucking surface includes a marginal convex on which a periphery of the object to be chucked is contacted to confine the heat-exchange gas within the concave portion, and the concave portion includes heat-exchange concaves for promoting heat-

exchange under increased pressure, and gas-diffusion concaves deeper than the heat-exchange concave for diffusing the heat-exchange gas to the heat-exchange concaves. The gas-diffusion concaves include circumferential concaves arranged coaxially to the stage and having an outermost concave located inside the marginal convex and a plurality of inner concaves inside the outermost concave, and radial concaves extending from a center of the stage to the outermost concave while crossing the inner concaves.

In Mountsier et al., a wafer cooling device includes a ceramic disk 52 with a gap 68 to be filled with a gas, a metallic support disk 56 disposed under the ceramic disk 52, and a metallic cooling disk 60 with a cooling water channel 106 disposed under the support disk 56. The ceramic disk 52 may have raised surface area 72', gas distribution channels 74, 74' extending radially on the ceramic disc 52 and annular ring 78.

In claim 29 of the invention, the gas-diffusion concaves include the circumferential concaves arranged coaxially to the stage. In Mountsier et al., all the gas distribution channels 74, 74' extend in the radial directions, not coaxially in the disk 52.

In claim 29, the circumferential concaves have an outermost concave located inside the marginal convex, and a plurality of inner concaves inside the outermost concaves. In Mountsier et al., there are no outermost concave and inner concaves.

In claim 33, in addition to the structure as defined in claim 29, it is clarify that all of the gas introducing channels communicates with the gas-diffusion concaves at positions off the center of the stage. In Mountsier et al., the gas inlet tube 110 is connected to the center of the disk 52, different from that defined in claim 33.

The features in claims 29 and 33 of the invention are not disclosed or suggested in Mountsier et al.

In Moslehi, a vacuum processor 10 includes a chuck 16 inside a processing chamber 12. The chuck 16 includes a chuck body 38, and a mechanical clamp 96 disposed on a periphery of the chuck body 38 and having an annular chamber 94 therein. The chuck body 38 has an array of concentric conduits 74 to convey an uninhibited flow of gas to and from a substrate 64, and a plurality of circumferential and radial channels 88, 90 for supporting flows of gas. The channels 88, 90 intersect with each other and the concentric conduits 74. The radial channels 90 extend through a periphery 92 into the annular chamber 94 bounded by the mechanical clamp 96, the chuck body 38 and the substrate 64.

In the invention, the outermost concave is located inside the marginal convex. Namely, the gas is confined inside the marginal convex. However, in Moslehi, the radial channels 90 pass through the outermost circumferential channel 88 and reach the annular chamber 94. Accordingly, the gas passing through the radial channels 90 flows outside the substrate 64, not confined inside the outermost channel. In Moslehi, the gas flows between the chuck and the substrate 64 into the mechanical clamp outside the substrate. Therefore, the structure of the invention is different from that disclosed in Moslehi.

In Sexton et al., an electrostatic chuck includes a chuck body 56 having through holes 46, a heat transfer body 58, and a plenum 80 situated between the chuck body 56 and the heat transfer body 58. A gas supplied to the plenum 80 for cooling the chuck body 56 is ejected through the through holes 46 to be supplied to the backside of the wafer.

In the invention, each lift pin is disposed in each gas introducing channel so that the heat-exchange gas is introduced to the concaves only through the gas introducing channels. In Sexton et al., the gas is simply supplied to the backside of the wafer, not the concaves of the dielectric block. Also, since the gas in

the plenum 80 is supplied through the through holes 46, the heat exchange efficiency is not good.

In the invention, since the gas is held inside the marginal convex, the pressure can be increased in a short period of time to improve the heat exchange rate. In Moslehi, since the gas pressure is increased while the gas flows under the substrate, it takes time to increase the pressure to cause the heat exchange rate slow. Also, in case the gas is filled between the substrate and the chuck body as in the invention, it is easy to provide the equal gas distribution. However, in case of increasing the pressure while the gas flows between the substrate and the chuck as in Moslehi, it is difficult to provide the equal gas distribution.

Also, in the invention, since the concave is formed at the outermost portion, the gas can be quickly distributed at the outer portion of the substrate to prevent the decrease of the heat exchange rate at the peripheral portion. In this structure, a plurality of annular concaves is formed inside the outermost concave, so that the heat exchange gas can be sufficiently distributed outwardly to thereby provide the equal and effective heat exchange. Also, since the radial concaves extend from the center of the chuck body in the invention, the heat exchange gas can be sufficiently supplied to the center of the chuck body.

The combination of the outermost concave, a plurality of circumference concaves and radial concaves of the invention is not obvious from the combination of the cited references.

Reconsideration and allowance are earnestly solicited.

A two month extension of time is hereby requested. A check in the amount of $420.00 is attached herewith for the two month extension of time.

Respectfully Submitted,

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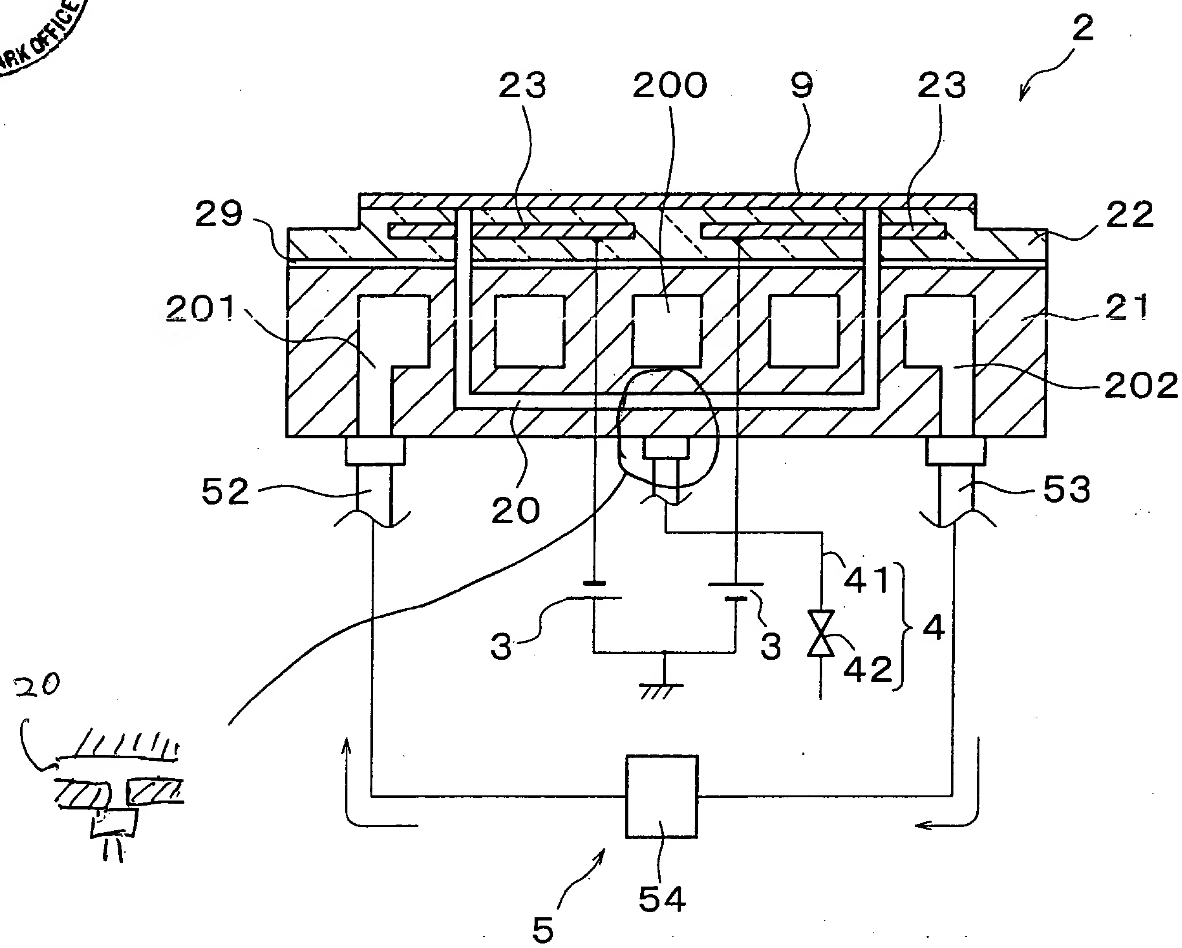

Fig. 1

Sn. 09/899,934

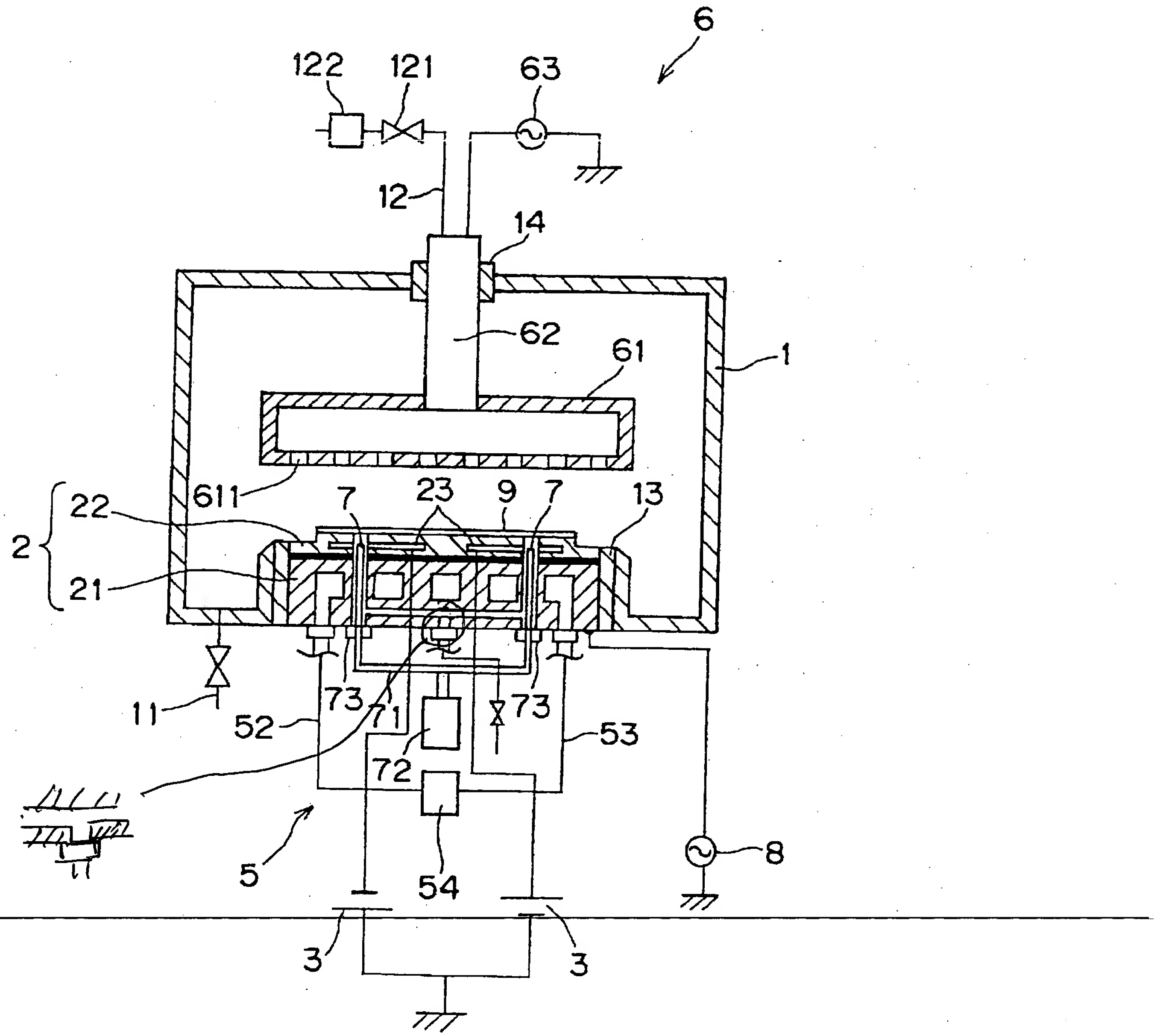

Fig. 7